

ART. XIII.—*The Genus Porotermes (Isoptera).*

By GERALD F. HILL.

(Entomologist, National Museum of Victoria.)

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Having experienced difficulty in making satisfactory identifications of termites of the genus *Porotermes* I have gathered together as much material as possible in the hope that its examination would reveal characters sufficiently reliable to enable specific determinations to be made with confidence. This hope has not been realised, but the data obtained appears to be of sufficient interest to justify its publication, more especially in view of its probable significance in the study of the larger and economically much more important allied genus *Calotermes*.

I am greatly indebted to Professor N. Holmgren for the type and a co-type of *P. grandis* and *P. froggatti* respectively, and to Mr. W. W. Froggatt for the loan of the types of *P. adamsoni*. The remainder of the specimens examined, representative of 44 colonies, are from the National Museum and my own collections. The contributions to these collections by Messrs. C. Barrett, F. E. Wilson, W. F. Hill and B. F. Hill were of particular interest and are gratefully acknowledged.

Historical.

Porotermes was proposed as a sub-genus of *Hodotermes* by Hagen (1858) for the reception of *Termes quadricollis* Rambur, from Chili. Froggatt (1896) accorded the group generic status under the sub-family Calotermitinae and Silvestri (1903) followed his classification in re-describing *P. quadricollis*. Desneux (1904) established the tribe Hodotermitini to include the genera *Hodotermes*, *Stolotermes* and *Porotermes*. Holmgren (1911) published a classification, since adopted by many but not all recent writers of note, in which four families and four sub-families were recognised, one of which was re-defined to include only the genera *Calotermes* and *Porotermes*. The first of these genera was subdivided into nine and the second into two sub-genera. Under the sub-genus *Porotermes* (s. str.) were listed *P. quadricollis* (Ramb.), *P. adamsoni* (Frogg.) and *P. froggatti* Holmgren, whilst the sub-genus *Planitermes* contained only the South African species *Calotermes planiceps* Sjöstedt (1904). *P. grandis* Holmgr., the fifth and last of the world's authentic species,¹ was not described until the following year (Holmgren, 1912).

1.—Fuller (1921) inferred that *C. amabilis* Sjöst. is a *Porotermes* and probably the winged form of *P. planiceps*.

Classification.

Key to the genera of Calotermitinae Holmgr.²

- Imago: i. Ocelli wanting. Empodia wanting. Cerci
 5-jointed *Porotermes*.
 ii. Ocelli present. Empodia present. Cerci
 2-jointed *Calotermes*.
 Soldier³: Cerci long, 5-jointed *Porotermes*.
 Cerci short, 2-jointed *Calotermes*.

A key to the sub-genera of *Porotermes* need not be given here in view of the distribution of known species.

It may be noted that soldiers of *Stolotermes* bear a superficial resemblance to *Porotermes*, but are easily distinguished by their small size, more flattened head and body, small heart-shaped pronotum and faceted eyes.

Observations.

POROTERMES ADAMSONI (Froggatt).

Calotermes adamsoni, Froggatt, Proc. Linn. Soc. N.S. Wales, xxi., 1896, p. 532.

Porotermes adamsoni (Froggatt), Gen. Insectorum, Fasc. 25, 1904.

It would have been unnecessary to add to the original description of this species, beyond recording that the antennae are 15 to 17-jointed in the imago and 16 to 18-jointed in the soldier, were it not for the fact that it is proposed to discuss another closely allied species in the following pages.

Froggatt noted that the soldiers vary in colour and size and this was evident in the Victorian specimens which I referred to in an earlier paper (Hill, 1921). The largest specimens then known to me fell so far short of the dimensions of the type (unique) of *P. grandis* that there appeared to be little possibility of confusing the two species; in the light of further knowledge, however, this may have actually happened in the case of the series from Healesville and Fern-tree Gully, the soldiers in which equal in size the smallest examples of *P. grandis*. The following detailed measurements of alate imagos and soldiers of *P. adamsoni* are from several complete series from Seaford, Waratah Bay and Lower Tarwin, Victoria, some of which have been compared with the types (from Uralla, N. S. Wales). The imagos in these colonies and in the type series are so closely approximated in size that in most cases one set of measurements only need be given. In the case of the soldier caste the measurements of two examples from each series are recorded except in cases where all

2.—After Holmgren (1911).

3.—There is no true worker caste in this sub-family; in it the functions of that caste devolve upon the immature stages of the winged imago and, possibly, of the soldier. The generic characters of this worker-nymph are the same as those of the soldier.

the individuals in the colony are of approximately the same size. The head and thorax give the most reliable measurements for comparative purposes since these parts are least affected by ordinary processes of fixation. All measurements are of specimens recently removed from alcohol.

Measurements of imagos (from Lower Tarwin, V., 4.3.25):

	mm.
Length with wings - - - - -	14.00 — 15.00
Length without wings - - - - -	7.00 — 8.00
Head, to apex of labrum, long - - - - -	1.82
Head, to clypeofrontal suture, long - - - - -	1.42
Head wide - - - - -	1.67
Eyes, diameter, 0.399×0.456 (vertically) - - - - -	
Wings, forewings, long 10.75; wide - - - - -	3.30
Pronotum, long, 0.79; wide - - - - -	1.40
Tibia iii, long - - - - -	1.53

Measurements of soldiers:

	Co-types.	Lr. Tarwin ⁴
Total length - - - - -	10.75; 10.75	10.00; 11.25
Head with mandibles, long - - - - -	3.81; 3.87	4.33; 4.56
Head without mandibles, long - - - - -	2.45; 2.33	2.85; 3.19
Head, wide - - - - -	2.28; 2.22	2.33; 2.50
Antennae, joints - - - - -	16; 16	16; 18
Gula at narrowest part, wide - - - - -	0.399; 0.425	0.456; 0.399
Pronotum, long - - - - -	0.85; 0.91	0.96; 0.91
Pronotum, wide - - - - -	1.71; 1.71	1.71; 1.82
Tibia iii, long - - - - -	1.71; 1.71	1.71; 1.71

	Seaford.	Seaford.	Waratah.	Waratah.
Total length - - - - -	9.75	9.00	8.75	10.00
Head with mandibles, long - - - - -	4.10	3.36	3.60	4.67
Head without mandibles, long - - - - -	2.85	1.22	2.28	3.19
Head, wide - - - - -	2.22	1.82	1.88	2.33
Antennae, joints - - - - -	16.17	16	16	16
Gula at narrowest part, wide - - - - -	0.399	0.342	0.399	0.342
Pronotum, long - - - - -	0.91	0.74	0.74	0.91
Pronotum, wide - - - - -	1.60	1.20	1.36	1.71
Tibia iii, long - - - - -	1.53	1.36	1.42	1.71

The above tabulation includes the smallest and the largest soldiers known to me that can be definitely determined (from their associated imagos) as *P. adamsoni*.

In a small collection of *Porotermes* received by the National Museum from Mr. Froggatt from New South Wales (Brooklana, (a) in rotten log, (b) in Hoop Pine stump, Gosford, Tuggerah Lakes and Mittagong) there are several series of soldiers and nymphs which appear to be referable to this species. One of them contains an apterous ("third-form") king measuring as follows: Total length 9.75; Head, long 1.99; wide 1.82; Pronotum, long 0.74; wide 1.42; Abdomen, wide 3.13. Except in its smaller size it agrees with the three similar apterous forms (queens) from Mt. Donna Buang, Victoria, referred to under *P. grandis*. It may

4.—From same colony as imagos referred to in above tabulation.

be mentioned here that the smallest soldiers associated with the latter are larger than the co-types of *P. adamsoni*, but smaller than some Tarwin examples of Froggatt's species.

This species appears to be a common one in South-eastern Victoria and New South Wales and it occurs also in South Australia. In nearly every case the colonies have been found in firewood, in dead standing timber or in logs lying upon the ground. Whether it attacks and destroys growing forest trees or not cannot be definitely stated, but it seems most probable that it does. There is at least one authentic record of several living pines (*Pinus insignis*) in a Melbourne suburban garden having been attacked and ultimately destroyed by this insect.

POROTERMES FROGGATTI Holmgren.

Kungl. Svenska. Akad. Hand., xlv. (6), p. 51, 1911;
Entom. Mitteilungen, Deutsch. Entom. Mus., i. (9),
p. 281, 1912.

Holmgren proposed the above name for a Tasmanian species the soldiers and workers of which, he states (1912), were incorrectly identified as *Calotermes convexus* (Walker) by Froggatt. No description appears to have been published.

In his first paper Froggatt (1896, p. 523) quoted Hagen's description of Walker's species (Hagen, 1858, p. 46) and in his later paper (Froggatt, 1915) merely summarised these descriptions and added that he had not been able to identify this termite in his collections. Holmgren gives no references to literature and I can find no original description by Froggatt of specimens purporting to be *C. convexus* (Walker). Walker described only the winged form of the last-named species, the descriptions of the soldier and worker being by Hagen.

I have before me a co-type of *P. froggatti*, as well as several small series of soldiers and nymphs from the same locality, all of which I believe to be conspecific. The following are measurements of representative soldiers:—

	Co-type.	Launceston.	Nat. Park.	Tas. (Froggatt).
Total length	12.25	12.07; 12.07; 12.25	12.25	15.40
Head, with mandibles, long	5.25	5.07; 5.07; 5.25	5.41	6.38
Head, without mandibles, long	3.64	3.42; 3.42; 3.99	4.16	4.78
Head, wide	3.07	2.67; 2.79; 2.85	3.19	3.81
Antennae, joints	15	15; 16; 15	15	—
Gula, at narrowest part, wide	0.570	0.570; 0.456; 0.570	0.570	0.798
Pronotum, long	1.19	1.59; 1.08; 1.14	1.25	1.53
Pronotum, wide	2.10	1.99; 2.16; 2.16	2.39	2.85
Tibia iii, long	2.28	1.82; 1.99; 1.90	2.22	2.56

In the majority the antennae are 15-jointed, the 3rd joint being conspicuously longer than 2nd and 4th and clavate; when 16-

jointed the 3rd joint is very small and 4th correspondingly reduced in length.

I can find no character by which the soldier caste of this Tasmanian form can be distinguished from *P. grandis*, but it is quite possible that good specific characters are to be found in the imago, which is still undescribed.

POROTERMES GRANDIS Holmgren.

Entom. Mitteil., Deutsch. Entom. Mus., i. (9), p. 281, 1912.

Until recently our knowledge of this species has been confined to the original description and remarks upon the unique type, a damaged specimen of the soldier caste (from Otway Forest, Victoria), with which I have compared several series now available for examination. In this caste it is the largest and most striking species known from the Australian Region, and it is probably the most destructive insect to be found in the great forest trees in the Healesville and Gembrook Districts. For the identification of the de-alated imagos and apterous queens referred to below I have relied upon a comparison of their largest associated soldiers with the type.

Imago (king).

Differs from *P. adamsoni* (Froggatt) only in measurements.

In the absence of an alate specimen I have designated the male (king) found in a colony taken at Emerald, Victoria, as the type (morphotype) of this caste. The measurements of this specimen and of the associated queen and soldiers are recorded in the following tabulations. The measurements of a king and queen (from ?Warburton) are given for comparison. It will be noted that they are smaller than the Emerald specimens and in some of their measurements approximate *P. adamsoni*.

Apterous adults.

Apterous reproductive males and females ("Adults of the third form," Thompson, 1917) appear to be generally present in colonies of this species and are sometimes the only reproductive caste represented. The head is ochraceous-tawny, the thorax and body a little lighter in colour; head, thorax and abdomen sparsely setaceous; eyes wanting. Measurements of examples from Mt. Donna Buang are recorded below.

Kings and queens. Apterous queens.

	Emerald.	?Warburton.	Mt. Donna Buang.
Length of body	♂ 9.50; ♀ 10.00	♂ 9.00; ♀ 11.25	10.50 - 11.00
Head, long	2.26	♂ 2.05; ♀ 2.16	2.16
Head, to clypeofrontal sut., long	1.76	♂ 1.71; ♀ 1.59	1.82
Head, wide	2.00	♂ 1.88; ♀ 1.82	1.82 - 1.99
Pronotum, long	♂ 1.02; ♀ 1.08	0.96	0.79 - 0.85
Pronotum, wide	♂ 1.90; ♀ 1.99	1.71	1.52 - 1.71
Tibia iii, long	1.93	1.82	1.93
Eyes, diameter	0.456 × 0.513	0.399 × 0.426	wanting

Brachypterous reproductive males and females ("Adults of the second form," Thompson, 1917) have not been found in any species of *Porotermes*.

Soldier.

For the purpose of showing the range of variation to be found in soldiers from the same colony and believed to be correctly referred to this species sets of measurements are given of the type and representatives of 7 nest-series from Victoria.

	Type (dried)	Donna Buang ⁵	Emerald Dist. ⁶
Total length	13·00	12·00; 12·00; 10·50	11·50; 12·00; 11·00
Head with mandibles, long	6·61	4·61; 4·60; 4·21	5·13; 5·35; 4·90
Head, without man- dibles, long	5·09	3·13; 3·13; 2·73	3·24; 3·70; 3·36
Head, wide	3·61	2·67; 2·67; 2·85	2·85; 3·02; 3·62
Antennae, joints	—	17; 15; 17	16; 16; 15
Gula at narrowest part	—	0·513; 0·513; 0·627	0·513; 0·513; 0·513
Pronotum, long	—	1·02; 1·02; 1·08	1·02; 1·14; 0·969
Pronotum, wide	2·28	1·99; 1·93; 1·99	1·99; 1·99; 1·88
Tibia iii, long	—	2·16; 1·99; 2·28	1·99; 1·93; 1·93

	Cockatoo. ⁷	Cockatoo.	Cockatoo.
Total length	14·00	14·50; 10·00	15·00; 11·25
Head with mandibles, long . .	6·21	6·00; 4·40	6·55; 4·44
Head without mandibles, long	4·44	4·44; 2·90	4·90; 2·90
Head, wide	3·70	3·30; 2·39	3·59; 2·67
Antennae, joints	15	14; 16	16; 16
Gula at narrowest part	0·627	0·570; 0·513	0·627;
Pronotum, long	1·42	1·31; 1·02	1·42; 1·08
Pronotum wide	2·79	2·62; 1·82	2·79; 2·05
Tibia iii, long	2·56	2·28; 1·82	2·45; 2·22

	Korumburra.	Fern-tree Gully.
Total length	— — —	13·00; 14·50; 10·00; 10·00
Head, with man- dibles, long	7·00; 6·84; 6·55; 5·01	6·09; 6·09; 4·44; 4·84
Head, without man- dibles, long	5·24; 5·13; 4·84; 3·42	4·44; 4·56; 3·07; 3·36
Head, wide	3·99; 3·47; 3·59; 2·79	3·36; 3·53; 2·62; 2·62
Antennae, joints	16; 17; 15; 16	16; 17; 15; 14
Gula at narrowest part	0·627; 0·570; 0·570; 0·513	0·627; 0·627; 0·570; 0·570
Pronotum, long	1·53; 1·42; 1·42; 1·14	1·14; 1·19; 0·96; 0·97
Pronotum, wide	2·90; 2·56; 2·85; 1·99	2·22; 2·50; 1·82; 1·82
Tibia iii, long	2·85; 2·56; 2·67; 2·05	2·10; 2·10; 1·76; 1·76

From a comparison of measurements of the smallest of the above with those of the largest authenticated examples of *P. adamsoni* it will be seen that size alone could not be depended upon to distinguish these species if only the smallest examples of the former and the largest of the latter were available for

5.—From same colony as apterous queens referred to on page 147.

6.—From same colony as king and queen referred to on page 147.

7.—Measurements of examples from three colonies are given.

examination. In most colonies, however, if marked variation exists at all, as it usually does, there will be found a majority of individuals distinctly below the average size of the larger species (*P. grandis*) or distinctly above the average size of the smaller (*P. adamsoni*) upon which a specific determination may be based. But there are several series in the collection from the lower foothills of the Dandenong and Beaconsfield Ranges which, being of uniform moderate size, might be attributed to either species in the absence of a more reliable character, which I have failed to discover. In *P. grandis* the mandibles may be proportionately a little stouter than in *P. adamsoni*, but the dentition is alike in all three species. The antennae are too variable to be of any use for diagnostic purposes.

The material at my disposal is not sufficient to justify the assumption that the two described Victorian forms are nothing more than races of the same species, but the apparent absence of any structural differences excepting that of size in both the imago and the soldier and the known distribution of the two supposed distinct species suggest that such may be the case. It is worthy of note that all the authenticated Victorian series of *P. adamsoni* are from low, sandy, coastal localities, whilst all the series here definitely referred to *P. grandis* are from heavily-timbered hilly or mountainous districts at elevations of from about 800 feet to 3000 feet above sea-level. The series of doubtful identity are those from the undulating country between the coast and the ranges and from the lower foothills and adjacent gullies.

In conclusion the following may be quoted from Fuller (1915): "It occurs to me that a further knowledge of distribution may show that environment has a marked effect upon the variation of several species, in both form and habit."

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